CLAIMS

1. A method for generating radicals comprising:

feeding F_2 gas or a mixed gas of F_2 gas and an inert gas into a chamber of which the inside is provided with a carbon material,

supplying a carbon atom from the carbon material by applying a target bias voltage to the carbon material, and thereby generating high density radicals,

wherein the bias voltage of not more than 600 V is applied to the carbon material to selectively form CF_3 radical and thereby high purity CF_3 radical is generated.

2. The method for generating radicals according to claim 1, wherein the carbon atom is generated by magnetron sputtering of the carbon material.

3. The method for generating radicals according to claim 1 or 2, wherein the target bias voltage is applied to the carbon material by a dual frequency combined magnetron in which a high frequency power source and a low frequency power source are connected in parallel.

4. The method for generating radicals according to any one

of claims 1 to 3, wherein the target bias voltage is from 480 to 600 V.

5. A method for generating radicals comprising:

feeding F_2 gas or a mixed gas of F_2 gas and an inert gas into a chamber of which the inside is provided with a carbon material,

supplying a carbon atom from the carbon material by applying a target bias voltage to the carbon material, and thereby

generating high density radicals,

wherein the ratio of CF_3 radical, CF_2 radical and CF radical is arbitrarily regulated by controlling the target bias voltage applied to the carbon material while measuring the infrared absorption spectrum of radicals generated inside the chamber.

6. The method for generating radicals according to claim 5, wherein the carbon atom is generated by magnetron sputtering of the carbon material.

7. The process for generating radicals according to claim 5 or 6, wherein the target bias voltage is applied to the carbon material by a dual frequency combined magnetron in which a high

frequency power source and a low frequency power source are connected in parallel, and is regulated by controlling the output of the low frequency power source.

8. A method for etching a silicon oxide film comprising:

etching a silicon oxide film using high purity CF_3 radical generated by the method for generating radicals according to any one of claims 1 to 4.

9. The method for etching comprising:

etching a film consisting essentially of a silicon oxide film and a resist using radicals containing CF_3 radical and CF_2 radical generated by the method for generating radicals according to any one of claims 5 to 7, wherein the ratio of the density of CF_3 radical to the density of CF_2 radical (CF_3/CF_2) is not more than 10.

10. A radical generating apparatus comprising a chamber in which an application electrode and a counter electrode are installed, and a means for feeding F_2 gas or a mixed gas of F_2 gas and an inert gas into the chamber,

wherein the application electrode comprises a carbon material and is connected with a dual frequency combined magnetron in which a high frequency power source and a low

frequency power source are connected in parallel, and the chamber is connected with an infrared absorption spectrometer so that IR laser irradiated from the infrared absorption spectrometer passes through between the application electrode and the counter electrode.

11. An etching apparatus comprising a chamber in which an application electrode and an electrode for mounting a substrate are installed, and a means for feeding F_2 gas or a mixed gas of F_2 gas and an inert gas into the chamber, wherein the application electrode comprises a carbon material and is connected with a dual frequency combined magnetron in which a high frequency power source and a low frequency power source are connected in parallel, an etching substrate can be mounted on the electrode for mounting a substrate and the chamber is connected with an infrared absorption spectrometer so that IR laser irradiated from the infrared absorption spectrometer passes through between the application electrode and the electrode for mounting a substrate.

12. A method for etching comprising:

feeding a mixed gas of F_2 gas and an inert gas into a chamber of which the inside is provided with a carbon material,

supplying a carbon atom from the carbon material by

applying a target bias voltage to the carbon material, and thereby

generating radicals containing CF_3 radical and CF_2 radical, and

etching a film consisting essentially of a silicon oxide film and a resist by using the radicals,

wherein F_2 gas concentration in the mixed gas is from 0.1 to 4.0 % by volume.